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ABSTRACT

Seychelles Integrated Science (SIS), a 3-year laboratory-based science program for students (ages 11-15) in upper primary grades 7, 8, and 9, was developed from an extensive evaluation and modification of previous P7-P9 materials. This P8 SIS unit focuses on reproduction in animals and in flowering plants. Particular topics examined include the structure of the flowering plant, pollination, fertilization, seed dispersal, chicken reproduction (including the chicken life cycle), human reproduction, pregnancy, and birth. Provided for the unit is a student workbook and a set of teaching notes. The teaching notes include an overview of the SIS program, the general aims of the unit, and a lesson plan for each topic area. Each lesson plan includes a suggested time frame, a list of objectives, a list of equipment needed, and a suggested lesson format. This format includes suggestions for introducing the lesson, instructional strategies (emphasizing procedures for student activities), and evaluation methods. The student workbook includes procedures for completing the unit activities and a list of new words keyed to page numbers in the workbook. (JN)

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seychelles integrated science

Unit 6

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TEACHING NOTES

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Seychelles Integrated Science

Introduction

Seychelles Integrated Science (SIS) is a three-year laboratory based science programme for pupils in P 7, P8 and P9 classes. It assumes that the pupils will have six, forty-minute periods of science each week, at least four of which will be in a laboratory. The programme aims to develop in the pupils;

1 The ability and willingness to look at and observe their surroundings and events in their surroundings objectively.

2 The ability and willingness to use a logical and rational "scientific" approach to everyday life based on objective observation.

3 A knowledge and understanding of scientific and natural phenomena and an ability to communicate with others about these.

4 An ability and willingness to use and relate scientific knowledge and skills to everyday life.

5 An awareness of the influence that science and technology have both on their everyday life and on the lives of other people, plants and animals.

If these five aims are achieved by the pupils then it is expected that they will be able to observe and record information about their surroundings and events in their surroundings using a systematic and controlled approach. They will be able to interpret and evaluate both qualitative and quantitative information so that they can reach a conclusion and substaniate it. They will be able to relate the scientific knowledge and vocabulary, appropriate to a fourteen year old, to the problems they encounter in their everyday life and they will be able to read and interpret relevant information so that they can reach informed decisions regarding the use and application of science and technology in their environment.

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To help achieve these aims SIS uses student texts, teacher's handbooks and a variety of audio visual materials. For 1984 it is hoped also to produce a series of pupils' background reading materials.

There are sixteen student units or booklets and a set of teaching notes for each unit. If you do not receive either the unit or the teaching notes please ask your school administrator to contact the Science Section of NIP. The student materials are produced in booklet form and we no longer use the worksheet format. So please do not let your pupils write on the booklets - you may need them again next year. Student's observations and records of experiments should be kept in a science notebook - or as we would prefer to call it a science workbook. The booklets are sequenced in nature so as far as possible go through the programme following the sequence of the units.

Units 1 to 5 in P 7,
Units 6 to 11 in P 8, and
Units 12 to 16 in P 9.

The units are intended for all classes within each form. There are some activities within each unit, however, which may only suit faster working or more able pupils.

Teaching notes are supplied for each unit and in these we set out the general aims of the unit and the objectives of the individual topics and lessons. We also list the equipment you will need for the lessons and give some idea of the time required to teach each topic. A <u>suggested</u> lesson plan is described for every lesson. You do not have to follow these lesson plans. They are sent only to help. We do ask, however, that you ensure that the pupils achieve the objectives set for each topic. You may wish to adapt the plan to better suit your school or locality, please do so but do make sure that at the end of the topic the pupils have achieved the stated objectives. The objectives are the most important guideline for the whole programme. Future examinations and evaluations will test the pupils' achievement of the objectives.

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In addition to the pupil's texts and teacher's notes there will also be some video tapes, 35 mm slides and cassette tapes linked to a number of the units. Where these are needed they will be referred to in the teaching notes. Please check through each set of notes as soon as you receive them to help you to order the audio visual materials and to borrow equipment from the Science Centre. If there are items of equipment that you need and they are not available in your school you should be able to borrow them from the Science Centre via your technician. Audio visual materials will either be sent out as part of your school resources or you can borrow them from the Television Liason Officer at NIP (Ext 162).

The new programme being introduced in 1983 has been developed following an extensive evaluation and modification of the previous P7 - P9 materials. The evaluation and modification has been carried out by the Science Section of NIP with the cooperation of the Inspectorate, Tutors at the TTC, the National Youth Service and teachers in P7 to P9 classes. The new materials aim to make the programme more relevant and meaningful to pupils. They are also designed to make lesson preparation easier and less time consuming for the teacher. Please study the aims of the programme carefully. You will see that in the programme we stress the importance of teaching children to USE the knowledge and skills that they acquire in science. We hope that not only will they be ABLE to use them but, just as important, they will WANT to use the scientific knowledge and skills they learn in school in their everyday lives at home and at work.

We ask you, the teachers, to please ensure that as often as possible, it is the pupils who carry out the practical work, it is the pupils who discuss and talk about what they see and do and it is the pupils who use their own words to write about their work.

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For some topics you may wish to carry out a demonstration experiment - but please make sure that for every double period lesson there is at least one activity that the pupils carry out. Avoid giving the pupils notes to copy down. When notes are needed , for example, when recording what happened in an experiment or describing the function of an organ, get the pupils to explain or describe what they observed or did, and then let them write their own notes. With some slower working classes you may need to help the pupils by writing out their verbal explanation on the board. As the pupils learn more about writing notes you will need only write the 'key' words of explanation and allow th pupils to use these as their guidelines.

Try to encourage the children to think about what they are doing Avoid using questions to which they can give 'yes' or 'no' answe Questions such as " Is this right ?" How many times ?" "Can yo see what happens ?" Instead ask questions which require the pupils to think about their answers and to give an answer of a sentance or more. "What happened when you did that ?" "Why do you think it happened ?" "What did you see ?" "What would happen if .....?" "Tell me how you would .....?"

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The P 7 - P 9 programme can only achieve its aims if science te frequently allow the pupils to

1. carry out practical work themselves,
2. think about and discuss what they observe and do, and
3. write about what they observe, learn and do, using their own words.

If teachers fail to do this, the pupils will become bored and indifferent and may come to reject science both in school and in everyday life. If the children enjoy and understand school science then there is every chance that they will understand an appreciate its use in their everyday lives and in their society.

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The Goals of Unit 6

In this Unit we introduce pupils to reproduction in the flowering plant and in animals. In plants we look at the structure of the flowering plant, pollination, fertilization and seed dispersal. We then look at reproduction in a chicken and discuss the life cycle of the chicken. We have choosen the chicken because of its economic importance in Seychelles and because most schools will be able to acquire chickens for dissection from their own agriculture projects. Finally in the last section of the Unit we look at human reproduction and discuss pregnancy and birth.

Although it is important that the pupils should recall and understand some of the words and terms used we have tried to avoid using technical vocabulary as far as possible and ask you that you stress the understanding of the different stages and processes in reproduction rather than the terminology.

As in the other units of the programme we will ask you to give the pupils as much opportunity as possible to discuss what they learn with you and with other pupils and to write about it in their own words.

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LESSON PLAN

Unit 6 Topic 1

The Structure of Flowers

Time A double period lesson. All pupils should complete activities 1.0 to 1.4. You may find that only the faster working pupils have time to carry out activity 1.5.

Objectives At the end of the lesson the pupils should be able to recognise and name the following parts of an eggplant flower, either from a photograph, a drawing or from real life; anther, filament, stigma, style, ovary, ovule, petal and stalk.
They should also be able to identify these same parts on a variety of other flowers such as, okra, hibiscus, cucumber, flamboyant and mouroum. At the end of the lesson the pupils should know that the anther and filament are the male parts of the flower and the stigma, style and ovary are the female parts.

Equipment For demonstration you will need examples of two or three varieties of flower. For each pair of pupils you should have a razor blade and at least one egg plant flower, and if possible a hand lens. You should also check out before the lesson that you can show some of the following flowers growing on the plant: okra, hibiscus, cucumber, flamboyant, mouroum, torato and patole.

A Suggested Lesson Format

Introduction Show the children two or three different flowers and ask them if they can tell you their names. Encourage the pupils to tell you about the different plants. How big are they- a tree, a bush, a small plant ? Where would you find

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it . - on a mountain, in a garden, in a swamp ?
What do the leaves look like - pale or dark green, red, yellow, broad or narrow ?

Activity

Tell the children that today they are going to look more closely at flowers and ask them to suggest why plants produce flowers. Let them develop the idea in discussion, until they know that plants need flowers to produce new "baby" plants

1.1 Let the pupils look closely at their flower. Let them feel the petals and ask them why they should be such bright colours. The get them to draw what they see inside the flower (1.2). Both you and the technician should go from pupil to pupil discussing their drawings and comparing them with the flowers. Encourage the pupils to make the drawings at least half a page in size. When they have finished the drawings ask them to turn over the page in their text and look at the diagram. Draw an outline of the flower on the board (1.3) and point out each of the parts - listed in the objectives. Identify the male and female parts. Ask each pupils to look at the different parts in the drawing in their book and then to find it in their flower. Get the pupils to label these parts on their own diagrams. 1.4 Bring the pupils to the agriculture project, or the school garden to look at a number of different flowers. Try to make sure that they see okra, hibiscus and at least two other flowers.
1.5 If you have time discuss with the pupils what similarities they observe between the different flowers and then ask them to write in their own words a note about each flower. Two to three lines about each will be sufficient.

Discussion and Evaluation

Draw an unlabelled diagram of a flower on the board. Then ask the pupils to name the various parts. Don't just check the understanding of a few but spread your questions around the whole class. Finally get the pupils to draw a number of the flowers they say in the garden and label the different parts on these. Check the pupils as they do this .

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LESSON PLAN

Unit 6 Topic 2

The Function of Flowers

Time

A single period. All pupils should complete sections 2.0 to 2.2. Only the faster working pupils may have time to complete section 2.3.

Objectives

At the end of the lesson the pupils should be able to use a microscope to look at pollen grains and use a handlens to look at a stigma, style, ovary and ovules. They should also be able to explain that; the anther and filament are the male parts of the flower and they produce the pollen grains, pollen grains are the male reproductive cell of a plant, the stigma, style and ovary are the female parts of a plant and they produce ovules, the ovules are the female reproductive cells.

Pupils who complete section 2.3 should also know that some plants, such as Coc-de -mer produce male and female flowers, that is flowers with only male or only female parts.

Equipment

Each group of 3 to 4 pupils will need a razor blade, a hand lens, a microscope and slide, a probe and spatula and at least one okra or egg plant flower (aubergine). If you intend to carry out section 2.3, you should check <u>before</u> the lesson that you can show the pupils male and female flowers , or photographs of pawpaw, coco-de-mer or pumpkin.

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Suggested Lesson Format

Introduction

Draw an unlabelled diagram of a flower on the board and ask the pupils to identify the different parts. Ask them to say which are the male and which are the female parts. As whether in animals, such as the cat, is it the male or female who produces the young. Ask the pupils if the female can produce kittens by herself, if not what part does the male cat have to play. Get the pupils to understand that both male and female animals are needed for reproduction. Explain that we call this type of reproduction - sexual reproduction because two sexes are involved. Tell the pupils that for a plant to reproduce sexually, a male cell must join with a female cell and that in today's lesson we are going to try to find some male cells from a flower.

Activity

2.1 Ask the children to find the male part of their flower, then ask them to touch the anther gently with their finger tip and see if they can find any 'powder' or 'dust' on their finger. Explain that this 'dust' is the pollen. Demonstrate how to scrape off a little pollen from the anther onto a slide and then get each group to do this and look at the pollen through the microscope. You and the technician should move from group to group helping the pupils to adjust and focus the microscope. Get each pupil to draw what they see under the microscope.
2.2 Ask the pupils to look at the ovary of the flower and to carefully cut it open, length wise, with the razor blade. Draw the ovary on the board and show them how to cut it. Again you and the technician should go from group to group while they do this and while they draw the ovary and ovule.

2.3 With the more able pupils you will have time to introduce the concept of male and female flowers. Without telling the pupils about male and female flowers, show them a female flower, or a good photograph of one, then ask them to show you the anther. When they discover that there are no male parts, show them the male flower. Discuss the idea that these plants have separate male and female flowers. At this

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there is no need to explain why this is so.

Discussion and Evaluation

Ask the children to describe to you what the pollen looked liked. The ask them can they remember what you said pollen was. On the board draw a filament and anther and an enlarged view of some pollen grains and write the pupil's wording of the statement that pollen grains are the male reporductive cells of the plant.
Ask the children to describe the ovules and to explain what the ovules are. Then draw a stigma, stylw and ovary on the board with an enlarged view of some ovules in an ovary. Write underneath the pupil's statement that ovules are the female reproductive cells of the plant. Ask the pupils to write the two statements into their exercise books and while they do so you should go from pupil to pupil marking their work.

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LESSON PLAN

Unit 6 Topic 3

Pollination of Flowers

Time A single period. All pupils should complete sections 3.0 to 3.3. Only the more able may have time to complete section 3.4.

Objectives At the end of the lesson the pupils should know that pollination is the transfer of pollen from the anther to the stigma. They should know that insects, such as bees and moths pollinate many flowers when they visit them to collect nectar. They should be able to explain in their own words that tiny hooks on the pollen grains 'catch' on to the bee's fur in one plant and are then 'rubbed off' in a second plant.

Equipment Before the lesson find an area where the children can see a number of different types of flower in bloom. You will also need a small paint brush available. If your pupils will be doing activity 3.4 you will need a small paint brush for each group and some pumpkin or passion fruit plants in flower.

Suggested Lesson Format

Introduction If you have a double period this lesson may follow on directly from Topic 2. If you have two single periods- revise the concepts that the filament and anther are the male parts of the flower and produce the pollen grains and that the stigma, style and ovary are the female parts and produce the ovules.

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Activity

Remind the children that we said that to start developing new plants there has to be male and female cells. The female cells - the ovules grow into the seeds but before they can start growing they must first join with a male cell. Ask the pupils to suggest how the male cell could join with the female ovule. After you have allowed them a few minutes for discussion tell them that the word we use to describe the joining or transfer of pollen from the anther to the stigma is pollination. Take the children out to the agriculture plot or garden and ask them to watch and make a list of the animals they see visiting the flowers (3.1) Allow them 10 to 15 minutes to do this. Get the pupils to suck the base of a banana or hibiscus flower to taste the 'sweetness'. Allow them another five minutes in the laboratory to discuss in a group the reasons for the animals visiting flowers. Each group should report their suggestions and from these establish that insects, such as bees, visit flowers to collect nectar for food.

3.2 Ask the pupils to look at their drawing of pollen grains and ask them to describe them. Draw the outline of a flower on the board and pretend that your hand is a bee poking down into the flower for nectar. Ask the pupils to describe what they think will happen as the bee brushes past the anthers , and then when it flies to the next flower to collect more nectar.

Discussion and Evaluation

Ask the children what do they think would happen if there were no bees or insects, what would happen to plants. Ask them what could a farmer do if there were only a few insects visiting the plants in his ground. Allow each a few minutes to discuss this question and then to report their suggestions, Help them to grasp the idea that the idea that the farmer could do the bees job himself, by pollinating the plants, for example, with a fine brush. Demonstrate how this could be done by transferring imaginary pollen from one black board drawing to another.

Ask the pupils to draw a picture into their books of a bee pollinating a flower and to write in their own words what we mean by the word pollination. Check around the class as they work.

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LESSON PLAN

Unit 6 Topic 4

From Flower to Fruit

Time A single period. All pupils should complete sections 4.4 to 4.6.

Objectives At the end of the lesson the pupils should know that after a flower is pollinated the petals will begin to wither and fade and the ovules will begin to develop into seeds in the ovary.
They should be able to explain in their own words that fruits of plants contain the seed or seeds inside the swollen ovary. Using the knowledge they have gained from topics 2,3 and 4 the pupils should be able to explain in their own words that,bees are beneficial to man because they help to pollinate the flowers of many fruits and vegetables and so increase the crop we get, and farmers can increase their crop of fruits such as pumpkin and passion fruit by pollinating the plants themselves.

Equipment Each group will need a razor blade or knife. Check before the lesson where you will bring the pupils to see fruits developing on the plant - preferably some with the petals still attached.

A Suggested Lesson Format

Introduction Revise last days work on how bees and other insects pollinate flowers, then ask the pupils what happens to the flower after it has been pollinated. Allow them 5 minutes to discuss this with their partners or group and then ask individuals to report what they have agreed on.

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Activity

4.4 Bring the pupils out to see the flowers and developing fruits. Compare the petals and the size of the ovary on a 'new' flower with that on a fertilised flower. Point out to the pupils how the fruit/ ovary continues to swell as it matures. 4.5 Let each pair or groupof pupils cut open a swollen fruit and identify the seed (s) developing inside. Bring the class back to the laboratory or classroom and discuss with them what happens to a flower after it has been pollinated. Get the pupils to write in their own words what happens. With some classes you may need to help by writing a number of the "key" words on the board. Get the pupils to draw a diagram of what they saw when they cut open the fruit.

Ask the pupils what will happen to the fruits/seeds they saw developing. Get them to realise that some of fruits will be eaten but that we may allow some to grow into new plants. Ask the children to describe how the flowers become pollinated and then ask them to suggest what would happen if bees or insects didn't pollinate flowers for us. From the pupils replies help them to draw the conclusions that bees are beneficial to man because they pollinate flowers, and in some cases man can pollinate flowers himself to help increase the crop he gets from plants. Get the pupils to write these conclusions down in their own words into their exercise book. 4.7 If you have time allow the pupils to look at and cut open a number of fruits from plants which we don't eat. Select a variety from local trees and shrubs.

Discussion and Evaluation

As the pupils write down their conclusions and draw their diagrams, you should move around from pupil to pupil checking and where necessary correcting their work.

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LESSON PLAN

Unit 6 Topic 5

Dispersing the Seeds

Time — A single period. All pupils should complete sections 5.0 to 5.2. Section 5.3 is optional.

Objectives — At the end of the lesson the pupils should be able to recall the names of two fruits that are dispersed by animals, two dispersed by wind, two dispersed by water, and two that are self-dispersed - i.e. go dry and split open. The pupils should be able to explain in their own words how one example of each of the four types is dispersed. The pupils should be able to apply their knowledge by identifying other - known and unknown - fruits as being either animal, wind, water or self-dispersed.

Equipment — Each group should have four cards or strips of paper, a razor blade or knife and at least one example of the four types of fruit listed on the worksheet. You can either have these ready or if you prefer take the pupils for a walk to collect them. The pupils are not expected to cut open a coconut in section 5.1. If you have a double-period check the activities section of this plan.*

Suggested Lesson Format

Introduction — Remind the children of the last lesson when they learned that after pollination seeds and fruits develop on the plants. Ask them to look at the different fruits which either you have provided or they have collected. Ask the pupils to describe the fruits to you in their own words and then to suggest reasons why the fruits are so different.

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Activity

Get the pupils to take their four strips of paper and write "By Animals" on the first, "By Wind" on the second, "By Water" on the third and "Self-dispersed" on the fourth. Let them then carry out activity .1 and afterwards write into their exercise books the reason- or reasons- why they placed each fruit into a group.

Discussion and Evaluation

Take one example of each type of fruit and ask each group of pupils what type of fruit their thought it was - ask them to explain their answers. In the discussion develop the characteristics of the four types of dispersal. If in doubt you can check these in Introduction to Biology by D G Mackean or Biology An Integrated Approach by R Soper and S Tyrell Smith. Sketch one example of each type of fruit on the board and get the pupils to draw these into their exercise books and then to write in their own words how each is dispersed.

If you have time available let the pupils visit the agriculture project to identify how the seeds of the plants there are dispersed (section 5.3).

* You may find that you complete Topic 5 at the end of the first period of a double period lesson, if so, we suggest that for the second period rather than move on to Topic 6 - you get the pupils to prepare large posters of the different types of seed dispersal. In that case you will need to make sure beforehand that you have the paper for the posters and either paint or felt-tip markers.

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LESSON PLAN

Unit 6 Project 1

Growing Plants From Seeds

Time — Project 1 should take a double period but you will also need to allow the pupils a few minutes during each lesson for the next two to three weeks to measure and record the growth of their seedlings.

Objectives — At the end of the lesson the pupils should be able to recall five plants that we can grow from seeds. They should be able to plant seeds at a given depth and for a given spacing. They should be able to measure the height of a seedling and record their results using a bar chart.

Equipment — One tray of seedlings for demonstration. Each group of pupils will need ten fruit or vegetable seeds for planting in the seed bed and a metre rule or measuring stick for measuring the depth and distance between seeds. You will need ti make sure that there is a seed bed ready for planting the seeds - if not you can use seed trays and later transefer the seedlings.
Also check beforehand for the correct depth and spacing for the seeds you will be planting.

Suggested Lesson Format

Introduction — Remind the pupils of their last science lesson and check that they can recall the four types of dispersal and give examples of each. Ask if anyone has ever planted seeds and if so ask them to describe what they did and what type of seeds they planted. The ask the rest of the classes if they can name some other plants that we grow from seeds. As they suggest names write them on the board. Use two columns one for the names of plants that we do grow from seed and one for those that we

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do not normally grow from seed.
Lettuce, cabbage, carrots, tomatoes, aubergine, peppers, okra, beans and cucumber are all grown from seed.
Banana, pineapple, cassava, taro and sweet potato are not grown from seed.

Activity

Tell the class that they will be going out to plant some seeds in the agriculture project. Tell them the name of the seeds and explain to them the depth they will need to plant and the distance apart the seeds must be. Show them how to measure the depth and width, then bring them out to the seed bed. Either you or the technician should demonstrate how to plant the seeds and then allow the pupils to plant theirs. Bring them back to the classroom and let them tell you what they did. They should then write this up in their own words. With slower classes use the key word guidelines on the board.

After the pupils have finished their write up, show them the tray of seedlings and tell them that this is what their seeds should look like in a few days. Explain that you want them to measure the height of ONE of their seedlings twice a week for the next few weeks. Demonstrate how to do this and then get a sample of pupils to do this . Discuss the need for them to measure the SAME seedling each time. Draw an outline of a bar chart on the board and ask a sample of pupils to show you how they would record the 'size' of a seedling - use one of the seedlings in the demonstration tray. Get the pupils to draw the outline of the bar chart into their exercise books and fix times for them to visit the seed bed to take their measurements.

Discussion and Evaluation

Get a sample of the pupils to explain to the class what they are going to do to measure the seedlings. Using the demonstration tray let them demonstrate how they will do this and how they will record it on the bar chart.

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LESSON PLAN

Unit 6 Summary 1

The Life Cycle of a Flowering Plant

Time A double period

Objectives In this lesson we want you to draw together all the information that the pupils have learned from the rest of the Unit so far. To date the pupils have had a number of isolated lessons about different topics, in this lesson we want to emphasize the underlying pattern of the life cycle of the plant.

Flower → (pollination) → fruit and seed → (seed dispersal) → seedling → plant

At the end of the lesson the pupils should be able to draw a diagram of the life cycle of a flowering plant showing each of the above stages.

Equipment A video film entitled - The Life Cycle of the Flowering Plant - is available from the Video Unit of NIP. Have your technician set this up in the video. Check through it yourself before showing to your pupils. The commentary on this video is a little too advanced for most P 8 pupils. A special commentary has been prepared for use with P 8. To use this run the video silently and run the commentary on a separate cassette player. If you want the separate commentary remember to order it with the video.

Suggested Lesson Format

Introduction Ask the pupils to report to you on the seeds they planted. Have they looked at them - watered them - ? Have any started to grow yet ? If so how many, how tall ?

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Activity

Discuss with the pupils why we plant seeds. Ask what would happen to plants if we didn't use them but left them in the ground. Get the pupils to realise that the seed grows into a seedling, then into a plant and the new plant can then produce flowers and seeds of its own. Sketch the different stages of the life cycle on the board and suggest that it is like a wheel - bicycle mean two wheels, this is a cycle - a life cycle.

Let the pupils watch the video. You may need to explain beforehand that with time lapse photography the camera only takes a photograph every two hours or so.

Discussion and Evaluation

Prepare five or six questions to ask the pupils about the film. For example, you could ask,
"How did the lady plant the seeds ?"
"What type of seeds were they ?"
"Why did she leave only one seedling in each pot?"
When you've asked the specific questions, ask the pupils to describe the life cycle of the tomato plant. In the discussion highlight the different stage including pollination and dispersal.

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LESSON PLAN

Unit 6 Topic 6

Reproduction in Animals

Time A double period. Taken with the Summary, Topic 5 may require 3 periods for some slower classes.

Objectives At the end of the lesson pupils should know the names of three female and three male animals, e.g. dog / bitch, bull / cow, boar / sow and cock / hen. They should also know that we get eggs only from the female bird - not from the cock (many pupils wrongly believe that small eggs are cock's eggs).
The pupils should be able to explain in their own words how a chicken is killed and plucked ready for cooking. They should be able to identify in a dissected bird - or a photograph or diagram of a dissected bird - the ovary, the oviduct and the cloaca. They should also be able to explain in their own words that a chick can only develop in an egg which has been fertilized by the sperm of a cock bird.

When the pupils are looking at the dissected bird you may wish to point out - the crop, gizzard, liver, kidney and intestine. But they are <u>not</u> required to identify these organs as part of this unit.

Equipment For the dissection you will need a dissecting kit with a good pair of scissors, a scalpel, pins, probe and forceps. If you are unfamiliar with killing, plucking and dissecting a chicken, your technician should be able to help you as technicians have been taught how to do this as part of their training programme. Also make sure you have arranged with the technician to have the chicken available.

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Suggested Lesson Format

Introduction

Ask the pupils how many of them keep chickens at home. Allow a number of them to tell the class about how many chickens they keep, and where and how they keep them. Ask the pupils what we call male and female chickens and then discuss the names we give to other male and female animals. After this ask the pupils who keep chickens at home why they do so. Ask do they get eggs from both hens and cocks - if not then why do they keep cocks.

Activity

After the discussion allow the pupils to work through Section 6.1 and write down the names of male and female animals into their exercise book. After this ask one of the pupils whose family keeps chickens to describe how they kill and pluck chickens. Then tell the class that today you (or the technician) will show them how to kill and pluck a chicken and then will dissect it for them.

Make sure that the chicken is killed as quickly and as humanely as possible. It is important that there should be no playing with the live animals or carry on as it is being killed. Arrange for all the pupils to be able to watch the plucking and dissection. If anyone feels strongly about <u>not</u> watching either the killing or the dissection you can arrange for them to work quietly on their own at the back of the lab. The main objective of this part of the lesson is to help the pupils to identify the reproductive organs, so you should carry out the dissection to demonstrate these - rather than the digestive or circulatory organs.

Draw a diagram of the dissected bird on the board and label the ovary, oviduct and cloacea. Ask individual pupils to point these out in the bird itself. Discuss the functions of these three organs. Then let the pupils copy your diagram into their exercise books and label the organs themselves. Finally allow them time to work through page 10 of their units and answering the questions into their exercise books.

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Discussion and Evaluation

Get individual pupils to read aloud the answers they have written down to each of the questions - Sections 6.3 to 6.7. Ask individual pupils in the class whether or not they agree with the answers read out. During the discussion on section 6.4 explain the word - fertilize- with the use of diagrams on the board. The pupils should know that for a hen's egg to be fertilized sperm from the cock must enter the egg.

The pupils' written and verbal answers to 6.3 to 6.7 will help you evaluate their understanding.

Ask the pupils to look at the life cycle of a chicken - Summary Sheet 2 - and then to describe it in their own words. You may need to help the slower classes here by helping them formulate what they will write using the key word technique.

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LESSON PLAN

Unit 6 Project 2

Growing Chicks

Time If there is to be a dissection this lesson will take a double period - without the dissection a single period will be sufficient.

Objectives At the end of the lesson the pupils should know that a chick develops inside an egg for 21 days before it hatches. They should be able to explain in their own words that the chick develops its organs in a sequence with the eyes developing before the heart and the heart before the limbs and that the feather develop only a few days before hatching. They should be able to identify the egg tooth either from a specimen, photograph or diagram and know that the chick uses this to break the shell before hatching.

Equipment A set of preserved chick embryos. The technician can borrow these from the Science Centre if you do not have a set available in the school. For each dissection you will need a scapel, a probe, fine scissors, forceps and a fertilised egg - incubated for 5 days or more.

Suggested Lesson Format

Introduction Revise the life cycle of a chicken with the pupils. Ask has anyone eaten an egg today / this week , thenask these pupils to describe what the inside of the egg looked like. Ask other pupils to describe what a chick looks like when it first hatches from the egg. Then ask can anyone explain how the egg changes into the chick. Allow the pupils some time to discuss this amongst themselves.

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Activity

Show the pupils one embryo at a time, starting with the least developed. Ask them to point out what they can see on each. Make a sketch on the board of each stage as they look at it and note down on the sketch what organs the children can identify on each.

If you have obtained a fertilized egg or eggs for dissection set the egg down 'sideways' and use the scissors to cut a small window in the side of the egg be careful that you penetrate only the shell . When you have cut out a complete window, remove it with the forceps, and then draw off some of the albumen with a medicine dropper so that the yolk/ young embryo is uncovered.

Discussion and Evaluation

If you have carried out the dissection ask the pupils how old do they think this embryo is. Ask them to explain their answers. Let the pupils draw a diagram of what they see inside the window. Then let them work in groups of three or four to write a paragraph explaining how the chick develops in the egg and let each group report to the class on what they have written. Finally get the pupils to draw the different stages of development that you have sketched on the board and to write their own - corrected - paragraph into their books.

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LESSON PLAN

Unit 6 Topic 7

Human Reproduction

Time A double period

Objectives At the end of the lesson the pupils should be able to identify on photographs and diagrams :

(i) the bladder, sperm duct, penis and testes in the male,

(ii) the ovary, oviduct, uterus and vagina in the female, and

(iii) the placenta and umbilical cord in a pregnant female.

The pupils should know that:

(i) the sperm is produced in the testes and passed out through the penis,

(ii) the eggs are produced in the ovaries and passed down the oviduct to the uterus, and

(iii) an embryo receives its food from the mother's blood through the placenta and umbilical cord.

The pupils should be able to explain in their own words:

(i) for an embryo to develop, sperm from a male must fertilize an egg in the oviduct or uterus,

(ii) if the ova is not fertilized then it will be passed out through the vagina along with some blood,

(iii) at birth a baby is born by passing through the mother's vagina and the doctor cuts the umbilical cord to separate the baby from the mother.

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Equipment — a slide projector and set of slides - entitled Human Reproduction.

Suggested Lesson Format

Introduction — Revise with the pupils the reproductive organs of the hen. Sketch a diagram on the board and ask the pupils to identify the ovary and oviduct. Explain that the ovary is the part of the female reproductive system where the eggs are produced and then explain that humans also have ovaries and that egg cells in humans are produced in ovaries in females.

Activity — Ask the pupils to look at the diagram of the human female reproductive organs in their unit. Identify and explain that the ovary is where the eggs are produced, that they travel down the oviduct into the uterus or womb. Explain that if the egg is fertilized it stays in the uterus, if not it passes out with some blood through the vagina. Tell the children that to help them learn about and understand human reproduction you are going to show them some slides and listen to a tape.

Start the tape and then show each slide as the buzzer sounds on the tape.

Write five or so questions on the board and using small groups of three or four allow the pupils fifteen minutes to discuss the questions. Use questions which will get the pupils to 'explain' things in their own words - questions such as,

(i) What happens in humans if an egg is not fertilized by sperm ?

(ii) What happens if an egg is fertilized ?

(iii) Why does the doctor cut the unbilical cord after birth?

Discussion and Evaluation — Let the groups write out their answers for the questions and then one member from each group should report the

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group's answer for the question. Finally allow the pupils 10 minutes to write up the classes agreed answers. While they are doing this you should go round the class checking their work and their understanding of the objectives. Discuss with the groups the different stages in the life cycle of humans - mentioning the egg, embryo, baby, child and adult. Ask the pupils to describe and explain the life cycle to you in their own words.

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SEYCHELLES INTEGRATED SCIENCE

Unit 6

SE045065
SE045065

LIVING THINGS REPRODUCE

SIS

UNIT 6

TOPIC 1

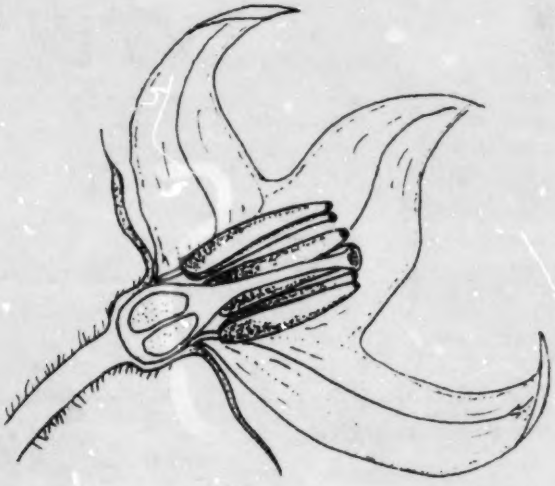
THE STRUCTURE OF FLOWERS

1.0 Many plants that grow in Seychelles have flowers. Make a list of 5 plants with flowers that you have seen today; write down the colours of each plant.

1.1 The STRUCTURE is the way the parts are arranged. You are going to look at the structure of a flower.

You will need a sharp blade and a flower.
Cut the flower in half - take care not to cut your fingers.

1.2 Make a careful drawing of one half of the flower in your own book. Your drawing should be at least as large as the flower.



An aubergine flower cut in half.

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UNIT 6

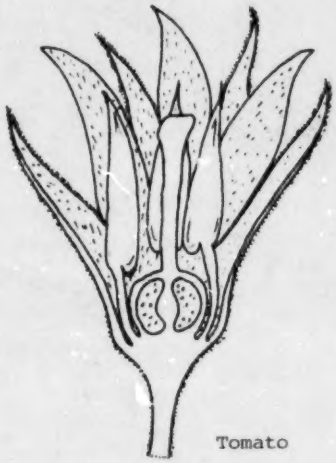
TOPIC 1

THE STRUCTURE OF FLOWERS

1.3 Your teacher will tell you the names of the parts of your flower. Label these parts on your diagram. (Remember to use a ruler for drawing straight lines).

1.4 Use a hand lens to look at some flowers on a different type of plant - DO NOT BREAK OFF THE FLOWERS.

Okra (lalo)



Tomato

Try to find the parts for which you have just learnt the names.

1.5 Write down the SIMILARITIES and DIFFERENCES between these flowers in your book.

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UNIT 6

TOPIC 2

THE FUNCTION OF FLOWERS

2.0 The FUNCTION of something means the job that it does. The function of flowers is to reproduce new young plants. To help them to do this, some parts in their structure are MALE and some other parts are FEMALE.

2.1 Male parts

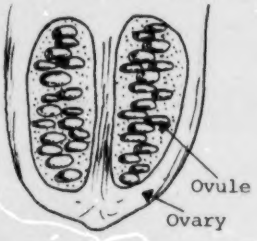
Look at an anther with a filament from a flower. Inside the anther there are very small pollen grains. Put some pollen grains on to a glass slide. Look at them through the microscope.

Pollen grain

Make a large drawing of one in your book.

2.2 Female parts

Look at the stigma, style and ovary from a flower.
Use a hand lens to look for the small ovules inside the ovary.



Make a drawing of the ovary with the ovules inside in your book.

2.3 Some plants have two different types of flower. One has only male parts, and the other only female parts. One such plant is the coco-de-mer palm.

Find out the names of other such plants and make a list of them in your book. Look at their flowers; can you see the difference between the males and the females ?

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UNIT 6

TOPIC 3

POLLINATION OF FLOWERS

3.0 A new young plant starts from a pollen grain (the male) and an ovule (the female). Pollination is the way in which pollen grains arrive at the stigma of the flower.

3.1 Go out and look at some different flowers. Make a list of any animals that you can see on or near the flowers. Underline those animals in your list which visit the flowers again and again.
Write down two or three lines to say why you think they visit flowers.

3.2 Look at your drawing of a pollen grain.
Do you think that a pollen grain could stick to an insect like a bee when it visits a flower ? Write down why you say so.

3.3 Insects can carry pollen from one flower to another. Pollination occurs when pollen from an anther lands on a stigma.
Make a drawing of a bee pollinating a flower.

3.4 Sometimes farmers need to carry the pollen from one flower to another. You can try this on pumpkin or passion fruit flowers, either at home or in the school agriculture project.

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UNIT 6

TOPIC 4

FROM FLOWER TO FRUIT

4.0 Once a pollen grain is on the stigma, it must grow down the style to reach the ovule. It can then FERTILISE the ovule by joining with it.

4.1 Go outside and look at some crop plants. Write a few lines to say what happens to the flowers as they get old.

4.2 Choose a plant where you can see young fruits growing from the old flowers.
Carefully cut open a fruit.
Make a drawing of the structure of a fruit.

Which part of a fresh flower can grow into a fruit ?

An okra (lalo) fruit cut in half.

4.3 Look inside some other fruits which are not crops. Note how they have developed from their flowers. Write and draw your observations in your book.

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UNIT 6

TOPIC 5

DISPERSING THE SEEDS

5.0 The fruit of any plant is the part where the seeds develop. Make a list of ten crop plants of which we eat the fruits.

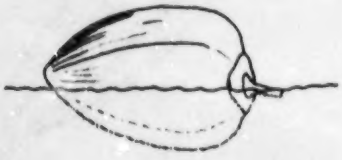
5.1 However, there are some types of fruit which we do not eat.
Make a collection of different fruits that are NOT crops.

List four types in your book:

Fruits that animals eat, or that stick to animals.

Fruits that the wind can easily blow away

Fruits that can float on water.



Fruits that split open when they are dry.

Look at each fruit in your collection. Group each one as one of the four types in your book.

5.2 Write down one line for each type to say <u>how</u> the fruits of those plants can disperse their seeds.

5.3 Look at the crops in the agriculture project. Who or what disperses their seeds ? Write one or two lines to say why it is important to disperse the seeds of crops. (Man first learnt about agriculture by dispersing wild seeds).

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UNIT 6

PROJECT 1

GROWING PLANTS FROM SEEDS

1. Make a list of five plants that we can grow from seeds.

2. Your teacher will give you some seeds which you will plant in the agriculture project.

   Write a few lines to describe how you plant the seeds.

3. You will have to go out and measure the height of your plants about every four days. You will also have to make sure that they are growing properly.

   They will need water; they may need support; they may need sun or shade. The teacher and the technician will help you to find out what they need to grow well.

   Your teacher will show you how to prepare a BAR CHART.

   Using the bar chart, you will be able to record how well your new young plants are growing.

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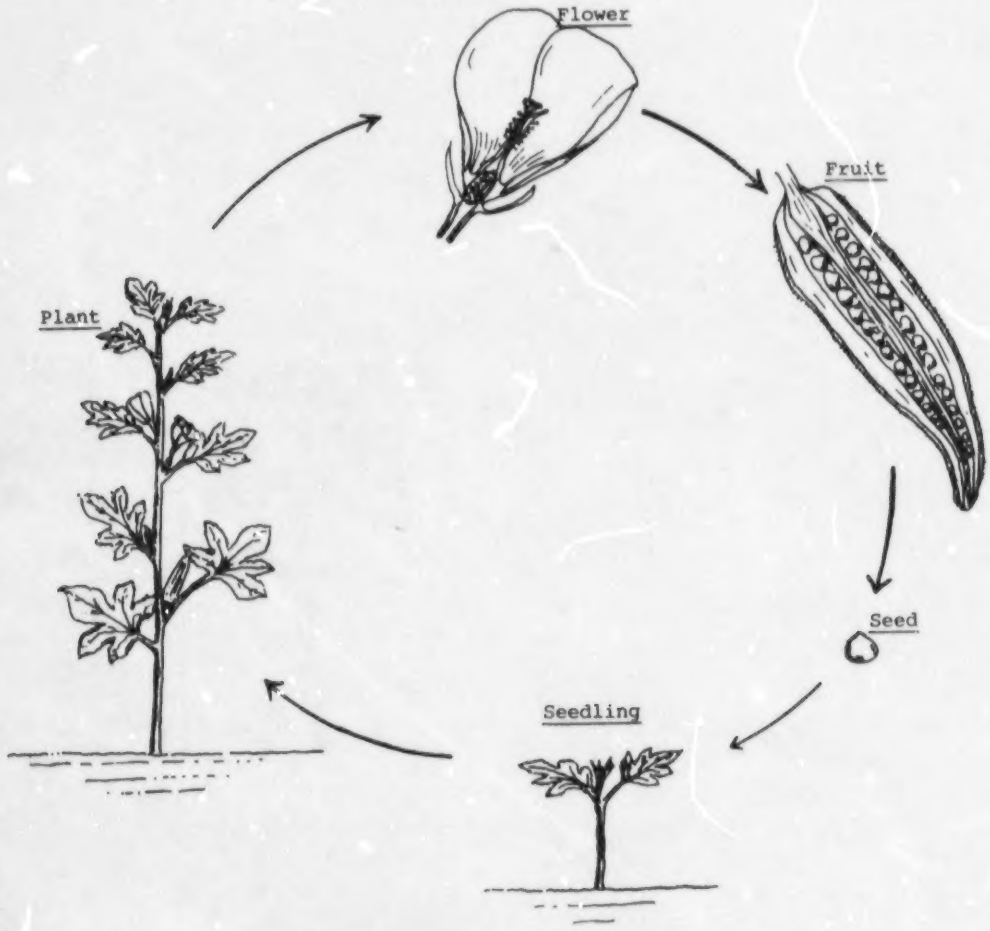
UNIT 6

SUMMARY 1

THE LIFE CYCLE OF A FLOWERING PLANT

This diagram shows the life cycle of a flowering plant - how a plant can reproduce new plants similar to itself.

Write a few lines in your own words about the life cycle of a plant that you have just studied in TOPICS 1 to 5.



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UNIT 6

TOPIC 6

REPRODUCTION IN ANIMALS

6.0 When we studied flowers, we learnt that there were male parts and female parts. We call these REPRODUCTIVE ORGANS. Some plants and some animals have both male and female reproductive organs in their structure. For example:

tomato plants; earthworms; snails.

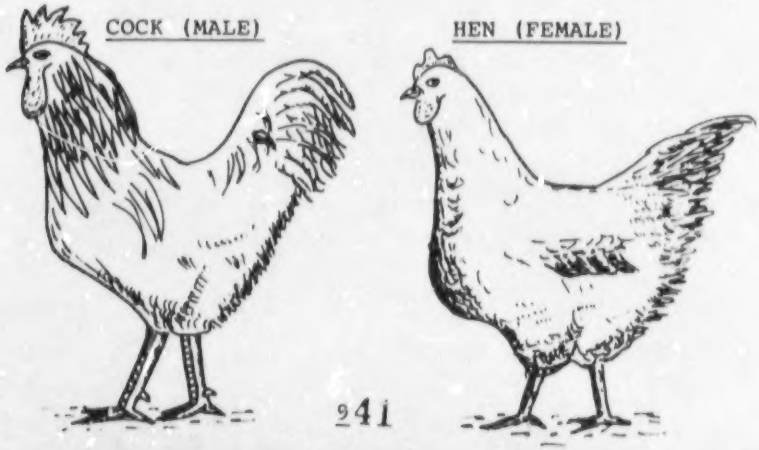
6.1 Many plants and animals are either male or female. They have different reproductive organs in their structure. Often we call the males and females by different names.

Write down the names of some female animals.

Write down the names of the males of these animals.

6.2 Chickens are very important animals, because we can get meat and eggs from them.
Do we get eggs from both cocks (males) and hens (females)?

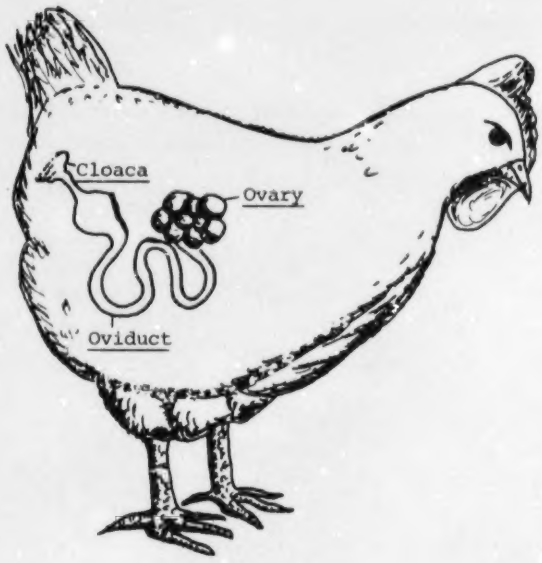
Can we eat the meat of both cocks and hens ?



REPRODUCTION IN ANIMALS - THE CHICKEN

6.3 Your teacher will arrange for you to see how we kill, pluck and dissect a hen. Use the diagram below to help you find the OVARY, OVIDUCT and CLOACA.

Which organ makes the eggs ?



6.4 If a cock mates with a hen, sperm from the cock can fertilise the egg. Then a new chick will grow inside the egg.
If the hen does not mate, then there will not be a chick inside the egg.
Do we eat eggs with chicks inside ?

Write a few lines to say how you could make sure that hens only lay eggs that are NOT FERTILISED.

What do mother hens do with their eggs to try and make them hatch out into chicks ?

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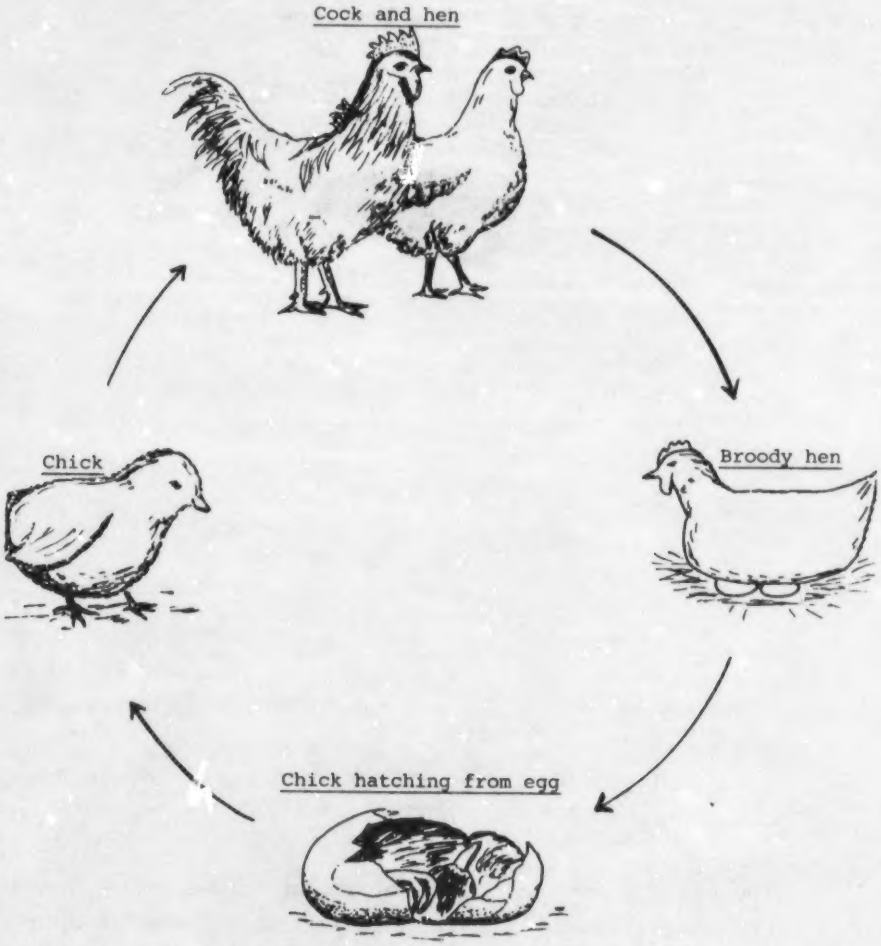
UNIT 6

SUMMARY :

THE LIFE CYCLE OF CHICKENS

The picture below shows the life cycle of chickens. Most birds have a life cycle like theirs.

Describe the life cycle of a chicken in your own words in your book.



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UNIT 6

PROJECT 2

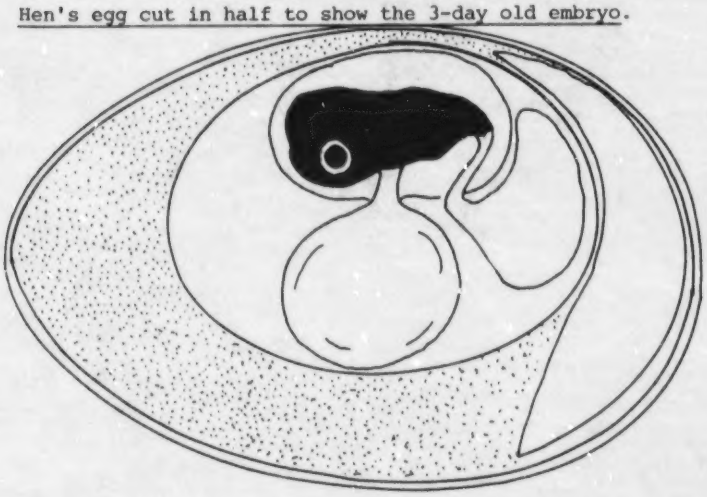
GROWING CHICKS

1. The technician has taken some embryo chicks from fertilised eggs and preserved them in a chemical.

   Look at each embryo and write down:

   - how many days old it was
   - which parts of its body you can see

Hen's egg cut in half to show the 3-day old embryo.



2. Your teacher may allow you to dissect a fertilised egg yourself.
   Draw what you see in your book, and write down your observations.

   You can follow the growth of young chicks by weighing them every week. The technician and science teacher can help you to weigh them and record the weight on a chart.

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UNIT 6

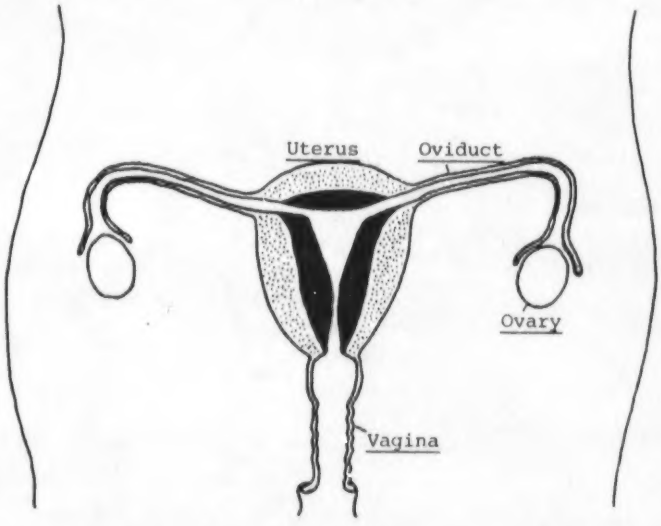
TOPIC 7

HUMAN REPRODUCTION

7.0 The diagrams on this page and the next page show human reproductive organs. They start to develop before we are born, but they do not finish developing until we are adults.

7.1 FEMALE REPRODUCTIVE ORGANS

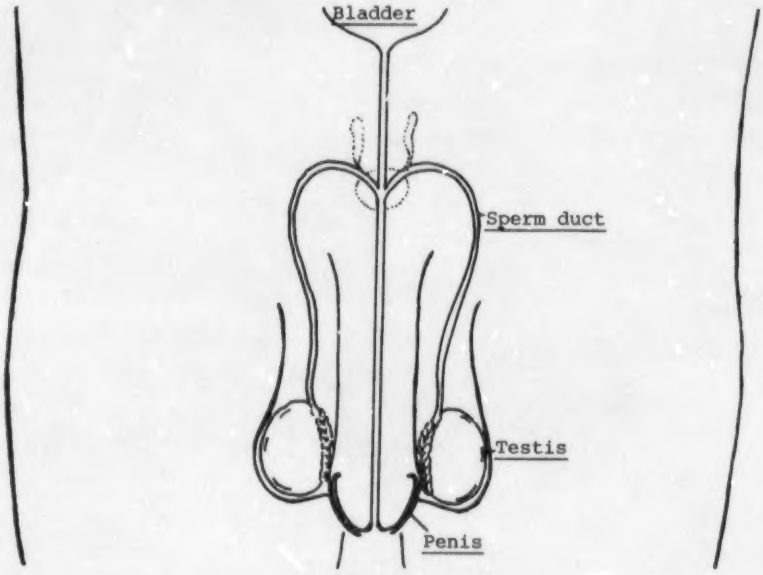
The ovaries are the reproductive organs of the female that make eggs. She produces one egg about every 28 days. An egg moves slowly from the ovary through the oviduct towards the uterus.



When the ovary releases an egg into the oviduct, the uterus starts to grow a thick lining.
If no sperm fertilises the egg, then the uterus passes it out along with a little blood, about once every 28 days. (This is called MENSTRUATION).

7.2 MALE REPRODUCTIVE ORGANS

The testes are the male reproductive organs that make sperm. A sperm duct joins each testis to the penis. (Urine from the bladder also passes through the penis).



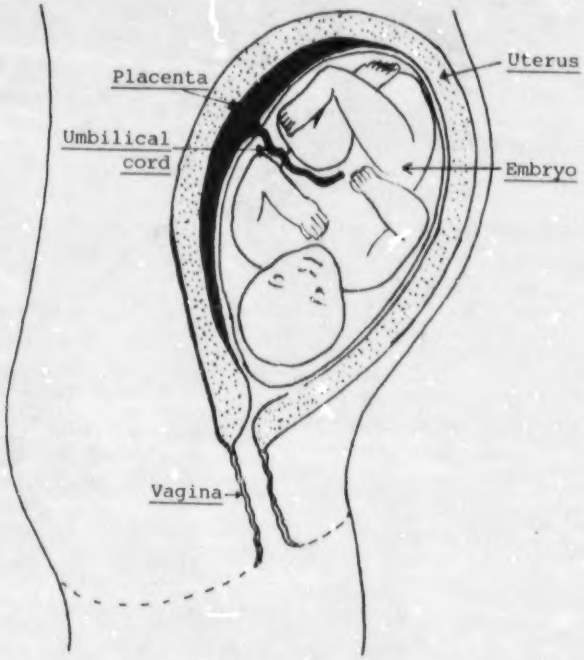
7.3 A female can become pregnant if she has sexual intercourse with a male. When the male's penis is placed in the female's vagina, it ejects the sperm. The sperm can then swim to the oviduct. If there is an egg in the oviduct, one of the sperm can fertilise it.
(If there are two eggs, you can get twins)

UNIT 6

TOPIC 7

HUMAN REPRODUCTION

7.4 A fertilised egg can grow and develop into an EMBRYO. This happens in the uterus. At birth, the walls of the uterus help to push out the baby. Most babies are born head first:



7.5 When the baby is born, the doctor cuts the umbilical cord, and helps the baby to start breathing. Then the doctor can tell the mother and father if their baby is a boy or a girl.

When both mother and baby have rested, the baby will need food. The mother feeds the baby with milk from her breast, where her milk is stored.

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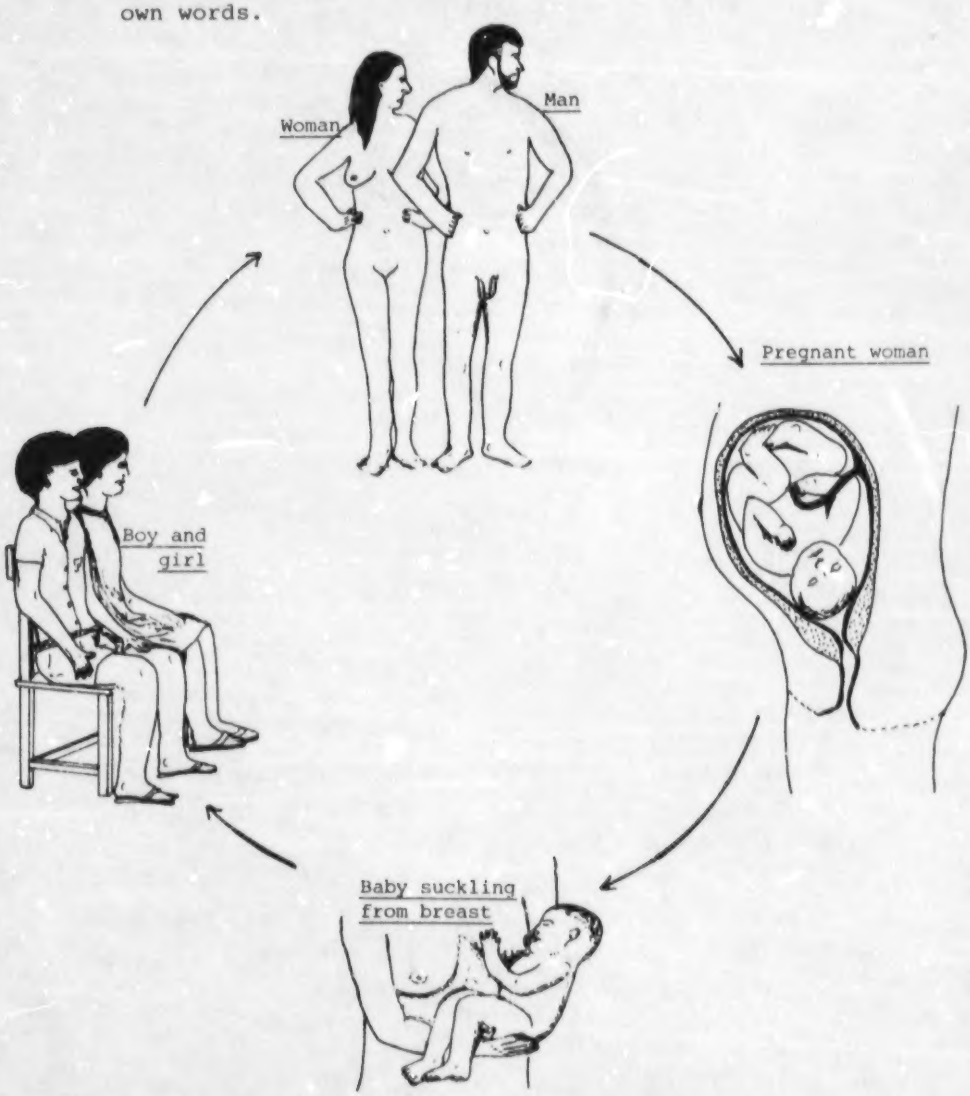
UNIT 6

SUMMARY 3

HUMAN REPRODUCTION

Look at the pictures below. They show the life cycle of humans.
Write about the life cycle of humans in your own words.



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